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SOME HISTORICAL ASPECTS OF PLANT TAXONOMY¹

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I have decided to speak to you today upon Some Historical Aspects of Plant Taxonomy, not because I am a historian but because of the imperative need of clearer understanding of our dependence on historical factors in proper interpretation of our floras and their component genera and species. The good old subject, natural history, in its very name seemed to imply something of this sort; but, as the late William Morton Wheeler so often lamented, natural history is out of fashion. I wholeheartedly subscribe to his opinion, for it so happens that I hold the title, so long made famous by Asa Gray, of Fisher Professor of Natural History. When, in the first half of the last century, that professorship (originally the Massachusetts Professorship of Natural History, founded in 1805) was established, the field of its incumbent was defined as including the organization of a botanic garden, the teaching of botany and entomology (with botany mentioned first) and the collecting of "all specimens in mineralogy . . . and after arranging them he shall deposit them in the Cabinet of Mineralogy belonging to the Corporation of Harvard College."

That was natural history indeed. Forthwith many of our colleges had professors of Natural History, who taught botany

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and zoölogy, with geology and mineralogy on the side. But the term and its full implication soon got lost; "biology" elbowed them out and more and more in too many of our institutions biology has become animal physiology and anatomy, with a partial recognition of plant anatomy and physiology and a smug indifference to taxonomy and the other interests which formerly constituted natural history. Section G of the American Association and its young daughter, the Botanical Society of America, as well as its numerous smaller granddaughters, have honorable titles, distinguished histories and sufficiently extensive fields of endeavor. May they maintain their autonomy and never become mere stepchildren of "biology". And what of the museums of Natural History? Many of them, still clinging to the old term natural history, have unblushingly divorced botany from their field of activity, natural history to them, like biology to many others, meaning merely the study of animals; and, absurdly enough, the term Natural History to some people, who have never seen over the boundary-fence which so often isolates the so-called humanities, seems to be thought of as a branch of human history. As a Professor of Natural History I regularly receive announcements and circulars from numerous historical organizations; and within three years I have been invited to prepare and present at an international conference, sponsored by our State Department in Washington, an original contribution in the field of political history.

But to come to my main theme. Plant taxonomy or systematic botany is coming back. More and more those whose botanical training ignored or overlooked this fundamental field are asking: "What is this plant; how can I find out what it is?"; and are giving concrete evidence of leaning, at least, on systematic botany. With this recent awakening to the importance and the great human interest of knowing at least by name and by superficial characteristics the common plants about us, the student is bound to ask: "Why do plants have Greek, Latin or latinized names? Why aren't the English names good enough?" He then will soon ask: "Why do you taxonomists often use different names for the same plant? Why, for instance, do Britton and Small call the bleeding-heart *Bicuculla*, while others call it *Dicentra*; why do the first two botanists call the tick-trefoils

Meibomia, others calling them *Desmodium?*" And above all, "Why do so many taxonomists disguise what they mean in describing new species by using 'dead' Latin; isn't living English the official language in the United States?" These are healthy questions. The answers to them should be clear.

One of the elementary interests of man has always been the classification in his own way and the naming of the natural objects around him. The peoples of all races have such classifications and names. It was natural, then, that among the earliest classical writers some should have turned their attention to plants and animals. It follows, therefore, that many of the names still current in botany date back to Pliny (23–79 A. D.), Dioscorides (first century A. D.) or Theophrastus (370–285 B. C.). Their viewpoint was largely that which after the Middle Ages became known as the "doctrine of signatures". These old names of plants, consequently, often reflect a supposed resemblance to some part of the human body, man, of course, being the animal most familiar to man. Several such names, unfortunately, cannot be literally translated in mixed society and my distinguished predecessor, Asa Gray, appending brief derivations of generic names in his *Manual*, coined for such names the naïve explanation "meaning recondite"! What would more certainly lead the true inquirer to his classical dictionaries?

Gray lived in the Victorian era. Nevertheless, in my student-days, listening to lectures on the fine arts by a professor who got his ideas chiefly from John Ruskin, I, as a devout young botanist, was forced to listen with tolerance to scathing remarks, by one who knew little about them, regarding the indecencies of plant-names, just as if nothing shocking is ever tolerated as art. Some years later, when a proposition was before the Harvard Faculty of Arts and Sciences to require all undergraduates to take at least one course in each of the major fields of learning (omitting botany and zoölogy), I urged the importance for everyone of some understanding of the principles of biology. My plea was promptly but unsuccessfully met by a professor of romance literature, he urging that biology is an immodest subject, as Ruskin had already shown.

We are gathered as workers and students in this vast field of botany and at the risk of shocking the finer feelings of the ghosts

of Ruskin, his former American disciple and the specialist on romance literatures, I propose to start with ancient names of plants having to do with generation of the human species and thence to refer briefly to the historic or traditional backgrounds of names which we all know. One of the most famous aphrodisiacs of all time has been the Mediterranean genus *Mandragora*, the mandrake. Its fame was so general that it found mention in the Old Testament. From the volumes of literature upon its supposed properties I quote a mild passage of the 16th century: "The roote is long, thick, divided . . . into two or three parts, resembling the legs of a man . . . There have been many ridiculous tales brought up of this plant, whether of olde wives or some runnagate surgeons or physickmongers, I know not (a title bad inough for them!) . . . They adde further, that it is never or verie seldome to be founde growing naturally but under a gallows, where the matter that hath fallen from the dead bodie hath given it the shape of a man; with many other such doltish dreames. They fable further and affirm, that he who woulde take up a plant thereof must tie a dogge thereunto to pull it up, which will give a great shrike at the digging up; otherwise if a man should do it, he should certainly die in short space after: besides many fables of loving matters, too full of scurrilitie to set forth in print, which I forbeare to speake of." The 16th century herbalist, however, was not content to stop there; he promptly added: "He that would know more hereof may read that chapter of doctor *Turner* his book concerning this matter."

Many museums of zoölogy or of medical science and anatomy display to an intelligent or unintelligent public a model of an infant in the mother's womb, with head and feet near together. We are, therefore, inevitably reminded of that large genus of plants of tropical and temperate regions, the birthworts, *Aristolochia*. This generic name, from two words meaning *best delivery*, came down at least from Pliny. It is nearly 2000 years old (probably older since of Greek origin and presumably borrowed by Pliny) and it was given because the Mediterranean species has the large calyx bent back, with summit and base together. The plant was, consequently, supposed to have been indicated by the Creator as an aid in child-birth. Neither the name nor its origin is now considered shocking; to Ruskin they were beyond the

pale. They are really most interesting, as opening our eyes to a curious philosophy of the past, which was the basis of much medical practice. The modern drug-store has on its shelf mandrake pills, although it is toward 3000 years since the plant gained its initial reputation.

Other familiar old generic names reflect the supposed generative (I mean no pun) powers of the plant; while still others reflect its supposed origin. The Mediterranean and oriental *Adonis* of the *Ranunculaceae* is credited with having sprung from the blood of the youthful lover of Venus, who, torn to shreds by a wild boar set upon him by the jealous Mars, was changed by Venus into the herb which annually springs into bloom. Similarly *Anemone*, with many red-flowered species in Asia Minor, commemorates *Na'man*, the Semitic equivalent of Adonis.

Still others of the ancient generic names were based upon resemblances to human organs, to diseased conditions or, in some cases, to familiar animals or their obvious characteristics. To this group belong *Chelidonium*, *Dracontium*, *Paronychia*, *Saxifraga* and *Juglans*. *Chelidonium*, swallow-wort, is a quick-growing small poppy with saffron-orange latex. According to Aristotle (384–322 B. C.) and other ancient scholars, the mother-swallows gather this herb and strengthen the sight of their young by painting the eyes with the orange juice. If you doubt the accuracy of Aristotle, Theophrastus and Pliny, examine a swallow's eye. You will there find the orange or yellow ring! *Dracontium*, for which our green dragon, *Arisaema Dracontium*, was named, has a long spadix projecting from the spathe, like the tongue of a dragon or serpent; a piece of dragonroot carried in the pocket was thought to keep away venomous beasts. *Paronychia* has dry chaffy scales and bracts like dry fingernails; it was, therefore, the reputed cure for the disease of the nails known as paronychia or, in English, whitlow, whence the colloquial name, whitlow-wort. *Saxifraga granulata* and related species bear small pebble-like grains and bulblets about the base, other species having them in the inflorescence. Consequently, by the inevitable ancient philosophy, they were a cure for calculi: "the root boiled in wine and drunken, breaketh the stone and driveth it forth." *Juglans* (the walnut), a name used by Cicero and others, is a contraction of *Jovis glans*, the nut of Jove, be-

cause of its supposed great power, as clearly indicated by the corrugated and folded flesh of the nut, resembling the human brain, in curing weakness of the brain and insanity. In these modern times the connotation of the word "nut" has become reversed. We should be cautious, nevertheless, about jeering at those modern faddists who live chiefly on nuts.

After the classical period and through the Middle Ages the study of botany suffered along with other learning; but with the Renaissance and perfection of printing learned doctors, chirurgeons and apothecaries, in addition to priests, monks and some country gentlemen, entered the field, and the sumptuous volumes, often beautifully illustrated and printed and larger than the traditional family bible, attest their zeal. To a great extent these students of the 16th and 17th centuries derived their matter from the ancient writers, but some of them showed marked originality. In these brief comments we must pass those centuries, until the publication in 1700 of the great work of Tournefort, *Institutiones rei herbariae*. In this monumental work, Tournefort, assembling from past students great volumes of condensed information, attempted for the first time on any such scale definitions of all recognized genera of plants, with concise and clear diagnoses, bibliographic references and drawings illustrating the diagnostic characters of the genera as understood by him. Tournefort, unfortunately, followed the universal polynomial nomenclature of his time, with each species designated by a long descriptive phrase. With the rapid advance in the science such long phrases became cumbersome and it was a great contribution of Linnaeus, that he reduced these descriptive phrases of the species to a single selected specific name, this, combined with the generic name, giving us the binomial, now in general use. Linnaeus accepted many of the genera as defined by Tournefort, citing the latter's diagnoses and figures. In interpreting such genera, taken over by Linnaeus directly from Tournefort, it is necessary to go back to the latter author. In other cases Linnaeus derived his generic names and their diagnoses from predecessors other than Tournefort and, of course, he coined many names himself and gave for them original diagnoses.

Since, by general agreement at international congresses, the nomenclature of plants begins with Linnaeus in 1753, the plant

taxonomist wisely stops in his backward search for interpretations with that date, except in cases where Linnaeus based his genera and species primarily on the work of earlier authors. This is fortunate, for in too many cases the older authors left no adequate specimens by which their descriptions and names can be checked; even the names of Linnaeus, whose great herbarium belongs to the Linnean Society of London, are frequently subject to different interpretations. Of that more later.

Returning to the origins of the names. The authors down to and including Tournefort and Linnaeus naturally accepted many generic names, such as *Calla*, *Iris*, *Myrica*, *Cannabis*, *Morus*, *Ulmus*, *Celtis* and *Cercis*, from classical writers, others from botanists of the 16th and 17th centuries, and inevitably coined many themselves. As interesting as any, taken over from Pliny and Virgil and perpetuated to our present time, is *Cornus*. In English we call it dogwood, as if it has some association with dogs; but the derivation of our English name seems to have been directly through the Latin generic one. *Cornus*, the ancient name, from *cornu*, a horn, referred to the hardness of the wood, a European species having long been used for skewers by butchers and for daggers and other sharp implements, whence the colloquial names in some English provinces, skewerwood and *dagwood*, the latter coming from the Old English *dagge*, a dagger or sharp, pointed object. *Cornus* and *dagwood* are, then, apparently closely related in meaning, and only by an erroneous etymology did dogwood become established as the English name of *Cornus*. It would be as pedantic to urge the abandonment of "dogwood" for *Cornus* as to insist that *Erythronium* shall not be called "dog-tooth violet." Those purists who insist that this name should be abandoned because *Erythronium* is not really a violet apparently lack human souls; they are merely tedious bodies and intellects. In ancient usage the term "violet" was applied to many showy spring-flowers, whether or not they belonged to the genus *Viola*. One of the ancient "violets" of the Mediterranean region and central Europe is *Erythronium Dens-canis*, *Viola Dens-canis* of the ancients, literally dog-tooth violet, because of the white and pointed ovoid bulb suggesting the eye-tooth of a dog.

All that I have thus far said concerns the folk-origin or the

ancient philosophic background of classical names of plants. To the extreme literalist many such names, based upon demonstrably erroneous assumptions, are misleading; to those who still cherish Santa Claus they are full of literary and historic connotation. At any rate the usually very mechanical international rules of botanical nomenclature insist on the retention of such old names as were maintained by Linnaeus in 1753. Coming back to consideration of the genera and species taken over from earlier botanists or first defined by Linnaeus, we find that he had a keen appreciation of the historic or mythological bases of names and their frequent folk-origin. To be sure he coined some which are descriptive, *Eriophorum* (bearing cotton or wool), *Alopecurus* (a fox's tail) and *Celastrus* (commonly evergreen); but when compared with such latter-day names as *Cynoglossopsis*, *Abromeitiella*, *Pseudoëpostoa*, *Haageocactus*, *Asta* of the *Cruciferae* (in Yankee pronunciation not distinguishable from the venerable name *Aster* in the *Compositae*), and *Saintpauliopsis*, even the more matter-of-fact names of Linnaeus become poetry.

Linnaeus wrote at great length upon the philosophy of botany and he had a strong contempt for malformed and hybrid names. His own (except a few barbaric ones taken over from non-Latin tongues) are models, and the keen imagination of the master was constantly at work. As a student, tramping from southern Sweden northward into Lapland, he became acquainted, on June 11, 1732, with the flesh-colored flowers of *Andromeda polifolia* and his youthful enthusiasm found exuberant expression. In his journal he wrote: "As I contemplated it I could not help thinking of Andromeda as described by the poets; and the more I meditated upon their descriptions, the more applicable they seemed to the little plant before me . . . Hence, as this plant forms a new genus, I have chosen for it the name of *Andromeda*."¹ The genus *Andromeda*, as understood by Linnaeus in 1753, was highly complex; and, forthwith, such scholarly botanists as David Don, Konrad Moench and Richard Salisbury, segregating it into its elements, followed the lead of Linnaeus and gave mythological names to the separated genera. That was as it should be; the anticlimax was American. The great manipulator of transcontinental railroads, the late Edward H. Harriman,

¹ *Lachesis Lapponica*, trans. J. E. Smith, i. 188, 189 (1811).

ordered by his physician to break away from his nerve-wrecking New York office, organized a yachting cruise to Alaskan waters, his invited party including botanists and other naturalists. Mr. Harriman keenly appreciated the refined beauty of the little moss-like shrub with delicate white flowers, the *Andromeda hypnoides* of Linnaeus, already separated as *Cassiope hypnoides* (L.) D. Don. Immediately, therefore, there was added a name in the group and those who maintain all the generic names proposed for species of the original *Andromeda* of 1753 must recite some of them as follows: *Andromeda*, *Cassandra* or *Chamaedaphne*, *Cassiope*, *Leucothoë*, *Phyllodoce*, *Pieris* and—*Harrimanella*. What taste!

One other case is of more strictly North American interest. I refer to Leatherwood, Moosewood or Wicopy, *Dirca palustris* L., the small tree-like shrub of rich woodlands of Atlantic North America. It is closely related to the Old World *Daphne*, but by Linnaeus was separated as the genus *Dirca*. The original material known to Linnaeus was collected by John Clayton along streams of interior Virginia: "Ad ripas fluminis R [o]janok dicta, aliorumque fluviorum prope montes".¹ Linnaeus, separating it from *Daphne*, consequently, with his fine feeling for propriety, took his cue from Clayton's statement of the habitat and named it for Dirca or Dirce, wife of Lycus, who, after her brutal murder, changed into the fabulous fountain Dirce. Linnaeus, however, was a better student of the classics than of English, for he rendered the English-American colloquial names: "Anglis Leater-voud s[ive] Mousevoud".²

Linnaeus delighted to honor in his generic names the outstanding and sometimes more humble botanists of his own and preceding centuries. In his *Critica Botanica* he stated that such "names formed to preserve the memory of a Botanist who has deserved well of the science I retain as a religious duty . . . I would sooner root out all generic names which do not in themselves express the essential character of the genus than one taken from the name of a Botanist who has deserved well of the science";³ but he did not, like some recent botanists, issue a

¹ Gronovius, Fl. Virgin. 155 (1739).

² L. Amoen. Acad. iii. 13 (1756).

³ Translation of Sir Arthur Hort, The "Critica Botanica" of Linnaeus, 61, 62. Ray Society, London, 1938.

joint report with reciprocal compliments, with first a species named by no. 1 for no. 2, then one named by no. 2 for no. 1 and so on through the volume. Most fortunately, the newspaper reporter's idea that taxonomists regularly name plants and animals for themselves is rarely so nearly exemplified. Linnaeus's own characterization of the genus named for him was as follows: "*Linnaea* was named by the celebrated Gronovius and is a plant of Lapland, lowly, insignificant, disregarded, flowering but for a brief space—from Linnaeus who resembles it."¹

In naming genera for others Linnaeus often exhibited the lively fancy so apparent in his other generic names. Two examples of these must suffice; these I have selected as belonging to genera familiar in Texas. "*Commelina* has flowers with three petals, two of which are showy, while the third is not conspicuous." Therefore, Linnaeus named the genus for three Dutch students of early date, "the two botanists called [Jan and Kasper] Commelin: for the third died before accomplishing anything in Botany."²

Everyone in the warmer parts of the Americas knows *Tillandsia*. It is closely covered with appressed scales which caused Linnaeus wrongly to infer that it sheds and has no use for water. With this false inference in mind he gave the generic name *Tillandsia*. It seems that a student, afterward a professor at Abo, crossed the Gulf of Bothnia by boat, to attend the university at Stockholm. He was so painfully seasick that thereafter he regularly made the journey, five times the shortest distance, overland around the head of the Gulf. Furthermore, in the Scandinavian fashion of his day, he assumed the surname Tillands, which signifies "by land"³. Who but Linnaeus would have grasped such a straw in seeking to name a new genus?

Occasionally, however, Linnaeus was misled, especially through the errors of others. The insistent genius of the English in anglicizing French words is proverbial. In my own wanderings in Newfoundland and southern Labrador this has been everywhere apparent. Bonne Espérance and Blanc Sablon of Cartier and other French discoverers of the region are "Bonny Spearens" and "Nancy Belong"; Griguet is "Cricket", and Le Quirpon is

¹ After Hort.

² After Hort.

³ Linnaeus, Praelect. Ord. Nat. 291 (1792).

"Karpoon". So with plant-names in various parts of the world. French explorers in the West Indies called one of the trees *bois fidèle*. By the English this was interpreted as fiddle-wood (of which no one ever made a fiddle); and Linnaeus fell into the trap, coining for it the correctly latinized Greek equivalent, *Citharexylum* (fiddle-wood).

In his descriptive specific names Linnaeus was particularly happy; they have been constant models for later botanists. In his geographic adjectives applied to American plants he was less happy. In continental North America he recognized six principal areas: Canada, Pennsylvania, Maryland, Virginia, Carolina and Mexico; these he seems to have drawn by lot and forthwith applied them. His *Potentilla pensylvanica* came from Hudson Bay; his *Berberis canadensis* from the Alleghenies. And several American plants, early carried to the Mediterranean by Portuguese and Spanish explorers, were assumed to have come from the East or Southeast, while the geographic sources of others were hopelessly tangled. The commonest and endemic temperate North American milkweed is *Asclepias syriaca* L.; the Atlantic North American *Conioselinum* is *C. chinense* (L.) BSP. These, after all, merely demonstrate that the great founder of modern taxonomy was human and that he had the proverbial European understanding of American geography.

There is not time further to follow the origins of our plant-names. Nor can I tax your patience by taking up the masterly works of hundreds of founders of taxonomy. The pioneer work of Clusius, Bauhin, Morison, Ray, Plumier, Dillenius, Burmann, Gronovius, Scheuchzer, Haller, Hill, Gmelin and their contemporaries tempts the chronicler of progress in the science, as do the wonderful forward steps of Lamarck, Robert Brown, de Jussieu, the DeCandolles, Jacquin, Willdenow, Koch, Kunth, Schlechtendal, Agardh, Fries, von Martius, Ledebour, Endlicher, Alexander Braun, Eichler, Schimper, Lindley, Decaisne, Bentham, the Hookers, Gray, Boissier, Regel, Hackel, Warming, Engler, Wettstein and a host of equally great or hardly lesser masters. Contemplation of the tremendous volume of fundamental work in taxonomy done before the period of electric lights, typewriters, short-hand, automobiles, radio and movies by such profound scholars as Lamarck, Alphonse DeCandolle,

von Martius, Ledebour, Boissier, Bentham & Hooker and countless others should bring a blush at least of modesty to many of us modern workers who so obviously seek to swell the weak personal bibliography by trivial and needlessly multiplied titles.

All these we must pass; proper discussion and appreciation of their work would require many volumes. In the remaining moments, moreover, I shall restrict my examples largely to cases in the only flora I know, that of temperate eastern North America; and I shall try not to wander too far from the elementary questions propounded in my opening paragraphs.

"Why do plants have Greek, Latin or latinized names? Why aren't the English names good enough?" From the days of Pliny to those of the most modern of taxonomists the use of Latin or Greek names has been the universal practice, the great taxonomic works of Linnaeus, Lamarck, Willdenow, the De Candolles and Bentham & Hooker upon worldwide floras, of Robert Brown on Australia, of Schlechtendal on Alaska, of von Martius on Brazil, of Gmelin or of Ledebour on Russian Siberia, and their hundreds of contemporaries and successors have been written wholly or with at least the names and technical descriptions in Latin. By common consent Latin for two milleniums has been the chosen language of scholarship; at any rate, scholars, seeking the best, have found much of it, first in Greek, later in Latin. Consequently the international rules of botanical nomenclature wisely lay down the fundamental principle (Art. 7) that "Scientific names of all groups are usually taken from Latin or Greek. When taken from any language other than Latin, or formed in an arbitrary manner, they are treated as if they were Latin. Latin terminations should be used so far as possible for new names." In general, taxonomic botanists have respected this principle, laid down by Linnaeus; but, especially in the earlier post-Linnean period, they sometimes dug up such barbarities as *Lablab*; on the other hand certain aboriginal American names, taken over for genera, like *Mayaca*, *Sassafras*, *Catalpa* and *Sequoia*, offend no one. If, as some in non-descriptive sciences so short-sightedly urge, the taxonomist, in clinging to the Latin or latinized names is non-progressive, what would they substitute? Surely a colloquial name like "cat-tail" or its equivalent in other languages is not widely intelligible. In many

parts of the United States and Canada it means *Typha*; but in Britain alone "cat-tail" has been colloquially used for aments of *Corylus* or of *Juglans*, or for inflorescences or plants in *Phleum*, *Equisetum*, *Scirpus*, *Echium*, *Eriophorum*, *Amaranthus* and *Hippuris*. Those who attended the International Botanical Congress at Ithaca, in 1926, will remember the session when the chairman of the excursion committee announced a trip where the party would pass an extensive "cat-tail swamp." Immediately the hundred Old World delegates looked questioningly at their American colleagues, until the Chairman of the session, the late Professor Ostenfeld, properly instructed, wrote on the blackboard: "Cat-tail = *Typha*." Then, but only then, all was clear. A system of vernacular names is not safe in exact taxonomy.

"Why do taxonomists often use different names for the same plants?" In the earlier days of modern taxonomy most of the detailed studies were made at universities or museums of competing European nations. Naturalists of diverse interest accompanied the great exploring or naval expeditions or were sent out on botanizing missions from France, Britain, Denmark, Sweden, Holland or Russia; and the plants brought back were studied and, when thought to be new, described by taxonomists of the national institutions or by those supported by the patrons of science. With limited personal contact between the earlier workers, it was inevitable that there was duplication of names or that different names were given to similar plants; and when the Americas entered the field of descriptive botany their remoteness from workers in Vienna, Berlin, Paris, Leiden, Copenhagen and even London was a perpetual handicap.

The bleeding-hearts were generally recognized as a genus during the first half of the 19th century and in the thirty years from 1824 to 1853 no less than eleven generic names were assigned to them by workers at different institutions: *Dicentra* by Bernhardi at Erfurt in 1833, *Cucullaria* by Endlicher at Vienna in 1839, *Bicucullaria* by de Jussieu at Paris in 1840; and other names by workers in centers as remote as Lexington, Kentucky, and St. Petersburg (now Leningrad) in Russia. *Dicentra* was extensively taken up and had long been preferred, when it was discovered that one of the somewhat irregular authors of names

(so irregular that some botanists have seriously proposed legislation to outlaw his names), Adanson, had proposed for the genus in 1763 the name *Bikukulla*. This has absolute priority and those botanists, who for some years opposed the international agreement to conserve the better-known names which lack technical priority of publication, picked up Adanson's name (altering it in a manner inconsistent with their professed insistence on strict priority, to *Bicuculla*). Many such instances occur, and the leading taxonomists of the world, recognizing that strict application of the principle of priority of publication in generic nomenclature would produce needless confusion, have very wisely adopted the principle of conserving such much-used and long-established names as *nomina generica conservanda*, with hearty approval of all but the most adamant. *Dicentra* is thus conserved; so is *Desmodium* over *Meibomia*. Were these and others not so conserved we should lose many names which have long since become established in taxonomic, morphological, horticultural and pharmaceutical literature: *Spirogyra*, *Vaucheria*, *Fucus*, *Selaginella*, *Podocarpus*, *Agathis*, *Sequoia*, *Welwitschia*, *Glyceria*, *Spiranthes*, *Carya*, *Calycanthus*, *Wisteria*, *Ailanthus*, *Vernonia*, *Liatris* and *Zinnia*, along with many hundreds of others. How would the traditional botanical laboratories and teachers of morphology respond if, following the strict principle of priority, they were told to discard the name *Spirogyra* and take up for it *Conjugata*, to throw out good old standard *Fucus* in favor of *Virsoides*, that *Selaginella* must be called either *Selaginoides* or *Lycopodioides* (published at the same date), that *Zamia* is *Palmafilix*, that *Sequoia* must become obsolete and we must call it *Steinhauera*? For some years loud outcries arose from a minute minority against *nomina conservanda*. Today such protests are scarcely heard.

The principle underlying *nomina conservanda* is sound; but the detection of long-familiar names which, unless conserved, must fall, is never finished. Obscure old books and papers, previously overlooked, come to light, like many of those of Rafinesque who, during his lifetime, was so generally erratic that his contemporaries ignored or destroyed his publications. It is authoritatively stated that a saintly and profound leader in American botany of a century ago, receiving isotypes of many of Rafinesque's pro-

posed genera and species and copies of his innumerable publications, conscientiously consigned them to a bonfire as the work of the Devil. Who today would not make great sacrifices to see authentic specimens of Rafinesque's species? When, therefore, rare, obscure or overlooked old works come to light, upsets are likely to occur. Since the original list of *nomina conservanda* hundreds of other names have been suggested for conservation. These include *Setaria*, *Rhynchospora*, *Loranthus*, *Nama*, *Helychrysum* and many scores more which it would be a pity to lose. Everyone discovering a good old name in danger of exclusion will do a real service by communicating it to the Secretary of the International Commission on such names.¹

Furthermore, the human equation comes in. Different points of view and different experiences lead to divergent conclusions. The sections or subgenera of one author are the genera of others. The genus *Pyrola* of a more conservative group of botanists is to some others a group of genera. The cytologically similar and freely hybridizing *Sorbus* and *Aronia* are to some, who lay more emphasis on habitual characters, satisfactory genera. To others they are congeneric and to others only subgenera of the inclusive genus *Pyrus*. These are honest differences of judgment and no legislation will solve them.

As to the use by all considerate taxonomists of Latin in publishing new diagnoses, a brief consideration will show that any other course would be selfishly inconsiderate; incidentally such publication would be invalidated by the international rules. Latin having been for more than 2000 years the language of scholarship in all western civilization, it is inevitable that no real student of plants and their proper identification and classification can possibly get beyond the mere threshold until he makes himself at least a slight master of the language of his subject and of his long line of outstanding predecessors. He may, like many of us, be forced to overcome the deficiency of school- and college-training, and his Latin may be very unpolished and unclassical; but by imitating such masters as Haller, Linnaeus, Schlechtendal, Blume, DeCandolle or Bentham he can make himself understood. Of course some absurdities result in the descriptions by those whose Latin is as weak as their taxonomy, as, for instance,

¹ Miss M. L. GREEN at the Royal Botanic Gardens, Kew.

in the case of one prolific author who joyfully strung together long phrases, all in the nominative singular. Nevertheless we can guess what was intended. It has been the practice, especially among European students, to append to their diagnoses, not their own names, but the Latin "mihi" or "nobis", thus modestly indicating that they are the authors. When, however, we find the editor of a two-volume government-supported work seriously including Nobis as a significant botanical writer it is difficult to restrain a smile: "*Nobis. Naturalista francés, que trabajó con Richard en la clasificación de las plantas cubanas de Sagra*"¹.

If we did not have occasional bits of such unconscious humor our work might become monotonous. When, however, one witnesses the undisguised belittling of a foundation-training in Latin, as well as of any real understanding of plant taxonomy, which pervades too many of the so-called and rather assertive recent laboratories of "biology", he can only pray that scholarship or the appreciation of it may not wholly disappear from botany. I am informed that students of morphology and taxonomy are regularly encouraged to gain such insight as they can into plant physiology. How often do present-day physiologists enroll in courses in taxonomy? If all botanists sympathetically grounded themselves in the elements of the major areas of their vastly inclusive broad field, such symptomatic incidents as the following would rarely occur. A young taxonomist and morphologist, desiring to have some insight into plant physiology, was reducing to ash (for chemical analysis) a flowering plant. After thus disposing of the root, stem and leaves he asked the instructor: "Shall I burn the inflorescence?" The prompt reply was: "Inflorescence? What are you giving us? I know all about efflorescence and fluorescence, but you've pulled a new one on me—'Inflorescence'!"

The latter incident and numerous others like it indicate that some groups of biologists have not materially broadened their outlook since the famous *faux pas* of 1902. At one of the relatively youthful American universities plant taxonomy has always been denounced. This may be because the original head of the department of botany there had once made a superficial

¹ *Estudios Sobre la Flora de Puerto Rico*, ed. 2: 49 (1936).—Pub. Fed. Emergency Relief Administration.

plunge at that exacting field without full appreciation of its dependence on precision. At any rate the attitude of the institution was clearly expressed by one of its more outspoken botanists as follows. After elsewhere explaining that he is one of "those of broader viewpoint," he wrote: "The world of morphologists, physiologists and ecologists has borne with" the sinning taxonomist "patiently and long . . . a little more and the sinning taxonomist will be 'cast out into the outer darkness where there shall be wailing and gnashing of teeth'".¹ This critic, who, in spite of his prejudices, later became a beloved friend of many of us, has unfortunately died; I am not informed whether he is now obliged to associate with taxonomists. But to come to the *faux pas* referred to. A thesis published from the botanical laboratory of the aforementioned university seemed, on the surface, to break down the reputed characters separating the *Saxifragaceae* (with 2 carpels, etc.) from the *Rosaceae*, because the student of professors who shunned taxonomy had found 2 carpels in "*Spiraea japonica*". Very soon, however, Professor Alfred Rehder² pointed out the fallacy; the erroneous deduction was based, not on *Spiraea japonica* of the *Rosaceae*, but upon *Astilbe japonica* Gray, a long-recognized and quite typical member of the *Saxifragaceae*. Ho, hum!

To such wholly satisfied workers as these the use of Latin in new diagnoses seems pedantic, unprogressive and far from their conception of "biology". To those of us who have to spend weary hours checking the descriptions of new species by taxonomists the world over, it is a blessing. If the peoples writing a language of non-Latin origin all insisted upon using only their mother-tongues we should never get to a common meeting-ground. When, however, the active taxonomists of Japan, China, Russia, Czechoslovakia, Italy, Germany, Scandinavia, England, Argentina, and the United States all forego their personal convenience and conscientiously put into understandable (though often halting and imperfect) Latin their new diagnoses, we can all interpret what is meant. Otherwise there would be perpetual darkness. Modern scientific Latin is a living language and an invaluable implement.³

¹ Am. Nat. xlvi. 270, 271 (1908).

² Rehder, Bot. Gaz. xxxiv. 246 (1902).

³ In this connection we may take justifiable pride in the fact that the conservative

I now come to one of the difficult but inescapable and time-consuming duties of the exact taxonomist. In these days no careful worker ever describes a new genus, species, variety or form without designating a special individual from among those he has studied to stand as the TYPE or standard for future students. He also should, and usually does, state in what herbarium it is deposited. But until comparatively recent times phytographers did not think in terms of TYPES or single selected standard specimens; they were concerned with the whole specific or generic concept and included within it all the material they had studied, without specially designating one as outstandingly representative. When DeCandolle, Engelmann or Gray had before him dozens or scores of specimens which he put together as one species they were all considered as typical. If they had only one specimen their interpreter in later years may regard himself as unusually fortunate. Attempts to formulate as a dogmatic rule procedure in determining which of several or many specimens shall be considered the type lead to constant error. One cannot wholly project himself into the minds of past workers, but the close student of a group may select the particular specimen which seems best to represent the original author's concept. In this, however, only the close student of the group should be trusted; merely mechanical selection is too doubtful. I may illustrate by a personal experience. In 1894, assigned to identify a large collection made by the late C. V. Piper in Washington State, I detected a plant which seemed to me specifically different from *Lathyrus polyphyllus* of Nuttall. Piper's plant had few large purple flowers, few leaflets and small stipules and, after studying its relationship, I published it as *L. pauciflorus*. Picking out

workers in American botany urged before the International Congress at Cambridge University in 1930 the retention of a requirement of Latin diagnoses for new plants. In the Proposals by the Sub-Committee on Nomenclature, appointed by the Imperial Botanical Conference and published in 1929 as the "Proposals by British Botanists", an attempt was made to weaken this requirement, the British Sub-Committee saying of their proposition (Art. 41, p. 40) "The requirement of a Latin diagnosis . . . is omitted". Subsequently, at the opening of the Congress, finding that the Japanese, Russians, Czechs, Scandinavians, most Americans and others were strongly for the retention of the Latin requirement, the British withdrew without argument their proposition. The joke was this: the dear old *London Times* editorially complimented the always scholarly British on winning their hard fight for the retention of the Latin diagnoses in the face of overwhelming opposition from the Americans and other crude peoples. So far as I could learn, this insinuation by the *Times* was never corrected.

from the herbarium two older sheets of specimens which I then identified with Piper's, I cited these in chronological order, Piper's more recent material coming last. Some years later a western student pointed out that the first specimen cited in the series was not conspecific with the others but that, since it was the first cited, it must be taken as the type. Such an interpretation, of course, was unjustified, because the description, when checked, was so evidently based upon the Piper material and so clearly excluded the plant erroneously placed with it. In this case the author of the species was able to make the decision. In case of authors of past centuries that is not possible.

When Linnaeus based a new species upon a single specimen or a single citation, the interpretation of his species is simple enough. Trouble begins, however, when he had associated with his own material descriptions of other and earlier authors. A single recently discussed case may make clear the problems we must face in selecting types for such Linnean species or genera.

The genus *Heuchera* of the *Saxifragaceae* started in 1737 almost simultaneously in the *Genera Plantarum* of Linnaeus and in his monumental *Hortus Cliffortianus*. In the former work he described the genus but in the latter he gave no description, merely citing his *Genera*, stating that it was North American and that it was named for Johann Heucher of Wittenberg; and appending references to descriptions of earlier authors which he thought to belong to his *Heuchera*. Here was the full treatment in *Hortus Cliffortianus*:

HEUCHERA. g. pl [Genera Plantarum]. 196

1. HEUCHERA

Cortusa americana, flore squalide purpureo. *Herm. par.* p. 131. *descript.*

Cortusa americana, floribus herbidis. *Herm. par.* t. 131.

Sanicula s. *Cortusa americana* spicata, floribus squalide purpureis. *Pluk. alm.* 332. t. 58. f. 3.

Mitella americana, flore squalide purpureo villoso. *Boerh. lugdb.* I. p. 208. *descr. floris.*

Primula veris montana laciniata americana, flore squalide purpureo. *Herm. lugdb.* 506.

Crescit in America, forte septentrionali, cum hyemes nostras bene ferat.

Dixi hoc genus plantarum a Joh. Heuchero, ex Horto Wittenbergensi claro, ejusque supplementis, in quibus varia curiosa lectuque digna exhibuit.

Since our nomenclature begins with the publication of *Species Plantarum* of Linnaeus in 1753 we next turn to that work, in which the binomial of the type of the genus appears, as *Heuchera americana* L.

americana. I. HEUCHERA. *Hort. cliff.* 82. *Gron. virg.* 29. *Roy. lugdb.* 437.
Cortusa americana, flore squalide purpureo. *Herm. parad.*
131, t. 131.

Sanicula s. *Cortusa americana* spicata, floribus squalide pur-
pureis. *Pluk. alm.* 332. t. 58. f. 3.

Habitat in Virginia. 24

In the treatment of 1753 no description was given, but Linnaeus referred immediately back to his own *Hortus Cliffortianus*, in which a reference was given to the slightly earlier *Genera Plantarum*. One of the references to Hermann was omitted but a new one (to Gronovius) was added; altogether there are eight descriptions given or cited.

What is the type of *Heuchera americana*? If, in preparing his *Species Plantarum* of 1753, Linnaeus had had in his own herbarium a specimen so named by him and matching his description (published in 1737) most of us would consider the question settled. In this particular case it is not so easily settled, for the late Dr. B. Daydon Jackson, for years a close student of Linneana, has clearly indicated that Linnaeus had no such specimen. We must, therefore, get out all eight volumes in addition to *Species Plantarum* and carefully compare them. To me, at least, the plants of the Clifford Garden, which were the basis of the wonderful *Hortus Cliffortianus* of Linnaeus, are next in significance, because they were actually before and described by that author. The plants he did not personally work with are of secondary importance. Fortunately, the Clifford Herbarium, preserved at the British Museum, contains the specimen. A photograph of it strongly suggests *Heuchera hispida* Pursh, rather than the plant passing as *H. americana*. If by some it be insisted that the specific name *americana* was taken over by Linnaeus from earlier botanists and that the plants of Hermann or that of Plukenet or of Boerhaave, as bearing that epithet, should be accepted, we are worse off still. Plukenet's figure is so conventionalized that it means little; Hermann's plate and some of the old descriptions lead directly to *H. villosa* Michx. Until, after the war, we can secure good photographs or make discriminating comparisons with the old specimens upon which Plukenet, Gronovius and others based their accounts we cannot be sure what they had. If, however, we stop, as I should do, with the material which Linnaeus himself described and ignore the miscellaneous and contradictory references, something clear will result.

What it is cannot positively be asserted until the Clifford plant is actually examined for details not brought out in a photograph.

This single and not very complicated case, except that it is upsetting to some of our cherished convictions, well illustrates the difficulties of the exact taxonomist, who must seek the solution of fundamental questions in the ancient collections of the Old World and in the literature of two or three centuries past. The eight citations above noted as essential in getting to the real identity of the Linnean species involved are only a part of them. Hermann and Boerhaave added others and more modern students have made their guesses and have published discussions until, in an attempt to elucidate a single basic fact it is often necessary to have open simultaneously about one no less than 20 or 30 volumes, some of them large folios and several of them rare. In the experimental and anatomical fields this is usually unnecessary. In those fields the books of the past, except as curiosities or as occasional landmarks, are relatively unessential; to the taxonomist who would trace his problems to final solution they are indispensable. The illustration I have given is a very simple one. Many similar ones require the checking and intensive study of twice as many volumes.

This intrinsic difference between the scholarly demands and historic background in taxonomic work (except that which glibly assumes that some one else will settle these troublesome questions) and the needs in the morphological and physiological fields is a serious handicap to many workers. Without the fundamental literature at hand they, obviously, can go only part-way; there they are forced to stop. Furthermore, in too many universities and museums, which really possess a good portion of the necessary literature, workers in taxonomy are perpetually handicapped through the short-sighted policy of administrative officers who, ambitious to make a great show of their library, insist on keeping in centralized stacks many of the books needed by special workers in remote corners of the institution. Too often these special workers, who alone have need of the old books, can secure those which are necessary for their precise work only after an amount of red-tape and delay which becomes deadening. I could tell you of at least one elaborate museum where taxonomic workers, instead of going through the great difficulties necessary

in securing from the distant library the essential books which they need, prefer to write to others hundreds of miles away, to look up, in a library maintained for the workers, points which are salted away but not readily accessible at their own institutions. Unless universities and museums make the essential books readily available to their technical staffs, who alone can use them, they can expect only indifferent results from their workers. In the fields where books are merely consulted and a few notes taken from them, centralization may be advantageous. In a field constantly dependent upon ready and simultaneous access to scores of volumes in settling a single point the essential books should be right at hand.

Another most important prerequisite to final results in taxonomy is access to the types or to accurate photographs of the types. Many thousands of species of the United States and Canada and similar numbers from the West Indies and South America were first described at European establishments. Similarly, thousands of species of the western half of North America were originally described in the Eastern States, as were many from the Pacific Islands and from eastern Asia. In the latter cases the types are readily available; in the former they are often scattered or unknown. On the whole, however, a remarkable proportion of the American plants described by pre-Linnean students, such as Plukenet, Catesby, Morison or Gronovius, are preserved. Several herbaria studied by Linnaeus are extant; these are now stored in vaults underground. The herbarium which partly formed the basis of Thomas Walter's *Flora Caroliniana* (1788) belongs to the British Museum. The tremendous herbarium of André Michaux, the basis of his two-volume *Flora Boreali-Americana* (1803), is kept apart from other collections at Paris. Other fundamental collections by the score are in European herbaria. Properly to interpret the species described it is necessary to know the original specimens. Photographs of many thousands of them have been made; other thousands remain to be photographed; but in many cases photographs alone do not give all that is needed. Minute details of diagnostic importance must be personally examined by the specialist. These studies, unfortunately, must await the new epoch we all are hoping for. Some of us, who have yearned to settle many points by personal

inspection of many types, will never do so, but they will eventually be properly studied and the absorbing and fundamental problems in the proper identification of our species will be settled.

Other historic factors in the proper study of taxonomy could be enumerated, for instance the very important work in tracing the exact routes of early explorers and collectors, such as is being so thoroughly prosecuted by Texan and other southwestern botanists. I must not, however, venture now into that large field, for I should soon tax your patience. The main points I have tried to emphasize are the historic and traditional background of plant taxonomy and plant-names; the dependence of exact taxonomy on the students and specimens of the past; the imperative need, if students in this field are to progress, of their having readily at hand the significant literature, dating back to 1700; and the need of still further studying the original specimens or types, from which our species have been described. This inevitable dependence on the work of the earlier botanists and their specimens is an intrinsic element in plant taxonomy; in the morphological and physiological fields the past and its literature are of relatively slight importance. If I have thus been able to make clear these fundamental differences of stress, I shall have done something to correct a misconception of taxonomy which in recent years has been too much fostered by those unfamiliar with its dependence on the past.

THE STATUS AND DISTRIBUTION OF SOME CYPERACEAE IN NORTH AND SOUTH AMERICA

HUGH O'NEILL

CYPERUS, SUBGENUS MARISCUS*

The name *Mariscus* in Pliny's *Historia Naturalis*¹ refers to a species of rush (*Juncus*). In 1742 Haller² used the word to describe a genus of plants which embraced a species subsequently called *Schoenus Mariscus* by Linné.³ Zinn⁴ defined the genus in

* [For a monographic treatment of *Mariscus* refer to Horvat, Sr. M. Liguori, A Revision of the Subgenus *Mariscus* Found in the United States. *Contr. Biol. Lab. Cath. Univ. America.* No. 33. 1941.]

¹ 21: 69. A. D. 77.

² *Enum. Helvetiae* 251.

³ *Sp. Pl.* ed. 1. 42.

⁴ *Cat. Pl. Hort. Gott.* 79.